

REPORT DOCUMENTATION PAGE

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6. AUTHOR(S) DR LARKINS JR					
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13. ABSTRACT (Maximum 200 words) 1. Deposition of good quality 123 and BTO films on LaA1O3 by laser ablation. 2. Surface roughness caused stiction issues have moved us to sputtered films at FIU - successful. 3. Good release and patterning using sputtered SiN and Si films for MEMs fabrication at Hanscom AFB have been demonstrated with adequate yields. Poor climate (humidity in the clean roOm) has destroyed the superconductivity of the samples making more runs necessary. Switches however DO function - problem is with the superconductor film. - Release problems have come back to haunt this effort.... 4. We demonstrated with the use of resonators incorporating switches that the insertion loss of such a switch can be less than 0.007 dB. 5. Several frequency agile resonators using switches were demonstrated along with down - state tuning of a switch.					
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***Future Aerospace Science and Technology Center
for Space Cryoelectronics
at Florida International University
(now strictly the MEM frequency agile work)***

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Final
~~Interim~~ Report
August 2005

20051005 124

***Summary of Personnel
Faculty (2):***

Dr Grover Larkins

Dr. Yuri Vlasov

Engineers/Post Docs:

Dr. M Brezniskaya

Jane Wang

Graduate Students (7):

Albert Bogoz

Jose Martinez

Yazan Hijazi

Dane Fairweather

Drayton Hanna

Jorge Vargas

Leon Lawrence

Undergraduate Students (1):

James Burke

Color key for personnel:

Black -- Still in the program

Blue -- Graduated and left the program

Green -- Moved up to the next level (MS to PhD Program etc.)

***Demographics of the FAST Center
for Space Cryoelectronics
at Florida International University
2002-03***

	<i>African American</i>	<i>Hispanic</i>	<i>Women</i>	<i>Asian</i>	<i>Other</i>	<i>Total*</i>
<i>Faculty/Staff</i>	0	0	2	1	2	5
<i>Graduate Students</i>	3	2	0	0	2	7
<i>Undergraduates</i>	1	0	0	0	0	1
<i>High School</i>	0	0	0	0	0	0
<i>Total</i>	4	2	2	1	4	10

**Some individuals are counted more than once, for example an African-American Woman is counted as a woman and as an African American.*

Faculty and Student Areas of Responsibility:

Microwave Design and Testing:

Dr. Grover Larkins

Yazan Hijazi

Jorge Vargas

Drayton Hanna

Dane Fairweather

Albert Bogoz

Leon Lawrence

Superconductor and Buffer Layer Deposition and Patterning:

Dr. Grover Larkins

Dr. Yuri Vlasov

Dr. Mary Brezniskaya

Albert Bogoz

Technical Progress:

Results:

1. Deposition of good quality 123 and BTO films on LaAlO_3 by laser ablation.
2. Surface roughness caused stiction issues have moved us to sputtered films at FIU – successful.
3. Good release and patterning using sputtered SiN and Si films for MEMs fabrication at Hanscom AFB have been demonstrated with adequate yields. Poor climate (humidity in the clean room) has destroyed the superconductivity of the samples making more runs necessary. Switches however DO function – problem is with the superconductor film. – Release problems have come back to haunt this effort....
4. We demonstrated with the use of resonators incorporating switches that the insertion loss of such a switch can be less than 0.007 dB.
5. Several frequency agile resonators using switches were demonstrated along with down – state tuning of a switch.

Summary:

The FAST center team has met its goals for this year. We have demonstrated High- T_c MEM switches in filters and resonators with very low losses.

Acknowledgments:

We would like to thank the following people/companies for their continued support of our project. Dr. John Derov, Dr. Rick Webster and Dr. Rob Reid.

Publications Appearing in Print this Past Year:

1. Corrales A., Vlasov Yu. A., Larkins G. L. BaTiO₃ on YBa₂Cu₃O₇ high T_C superconductors – Microwave Properties. *Integr. Ferroelectrics*, 2002, v. 42, p. 123-129.
2. Larkins G. L., Vlasov Yu. A. A comparative study of YBa₂Cu₃O₇ microwave hairpin filters vs. aluminum microwave hairpin filters. *Physica C: Superconductivity*, 2002, v. 372-376, pp. 543-545.
3. Vargas J., Larkins G., Vlasov Yu. Design, fabrication and testing of a microwave filter using YBCO on a YSZ buffered (100) Si substrate. *Physica C: Superconductivity*, 2002, v. 372-376, pp. 536-539
4. Vlasov Yu., Brown P., Sayed S., Larkins G. Superconducting microstrip resonator on YSZ buffered Si. *Physica C: Superconductivity*, 2002, v. 372-376, pp. 626-629.

Conference presentations 2002 – 2003:

1. Lawrence L., Hijazi Y., Noel J., Vlasov Yu.A. and Larkins G.L., Jr. "MEMS Switch High T_c Superconductor Tapped Microstrip "T" Resonator." ISEC 2003, 7-11 July 2003, Sydney, Australia, Program and Extended Abstracts, Ptu24.
2. Fairweather D., Hijazi Y., Vlasov Y.A. and Larkins G.L., Jr. "MEM Switched-Based Microwave High T_c Superconductor Resonator Tuning." ISEC 2003, 7-11 July 2003, Sydney, Australia, Program and Extended Abstracts, Ptu25.
3. Noel J., Hijazi Y., Vargas J., Vlasov Y.A. and Larkins G.L., Jr. "A Switched High T_c Superconductor Microstrip Resonator Using a MEM Switch." ISEC 2003, 7-11 July 2003, Sydney, Australia, Program and Extended Abstracts, Ptu26.

Funded Spin - Off Proposals

Spin-Off Proposals Funded:

1. Extreme dielectric loading of broad-band High Tc superconducting antennas by Grover L. Larkins, Jr. and Yuri Vlasov of the Future Aerospace Science and Technology Center for Space Cryoelectronics at Florida International University. Funded (\$160,000) by the Office of Naval Research (2002).
2. Superconducting MEM switches for microwave power applications. Funded by AFOSR (\$394,635) in November 2001. Yuri Vlasov and Grover L. Larkins